

SECRET

Approved For Release 2004/03/26 : CIA-RDP78B05171A000200020201-3

NPIC/TSSG/RED-069-70  
19 February 1970

MEMORANDUM FOR: Chief, Research & Engineering Division

SUBJECT: [ ] Pre-Heat Feature

1. I have reviewed the situation concerning the pre-heat feature and its alleged usefulness or non-usefulness on the [ ] 940 Split Format Light Table, and its anticipated use on the [ ] 1540. There seems to be a great deal of confusion in this area. In an attempt to resolve this confusion, I have discussed this with the project officers on the 940 and 1540 Light Tables, [ ] respectively. In addition, I have contacted [ ] Chief Engineer at [ ] [ ] The situation appears to be as follows:

a. The 940 Split Format Light Table has a 3,000 foot lambert light source. In order to permit the light source to operate in the higher intensity range without excessive external heat, a liquid coolant system was introduced in the form of a jacket surrounding the lamp coils. While this liquid coolant system solved certain heating problems, it created an additional problem in that the presence of the cooling liquid prevented the cool cathode light source from quickly reaching its optimum operating temperature, thereby, resulting in instability of the light source.

b. This slow rise to operating temperature has two adverse effects. Both resulting from instability of the light source. (1) the light has a tendency to flicker when operated at low intensity. Low intensity is necessary when viewing low density transparencies. (2) The light takes longer to reach maximum output; i.e., 3,000 foot lamberts. High intensity is necessary when viewing high density positives.

2. The cold cathode lamp operates best at about 105°F. If the temperature rises much above 135°, the efficiency quickly falls off, requiring more and more current to produce less and less light. Below 105° the mercury tends to condense and puddle in the tube, resulting in an unstable condition. This lack of stability results in poor efficiency and unacceptable flickering.

3. There is some question as to the efficiency of utilizing the pre-heat feature with regard to reaching maximum brightness more expeditiously. This appears to be related more to poor engineering than to the actual theory involved. In the original installation, [ ] did not have the pump

Declass Review by NIMA/DOD

Approved For Release 2004/03/26 : CIA-RDP78B05171A000200020201-3

SECRET

GROUP 1  
Excluded from automatic  
downgrading and  
declassification

SECRET

25X1  
SUBJECT: [ ] Pre-Heat Feature

circulating when the pre-heat feature was on, thereby, depending exclusively upon convection--which would have been almost non-existent; however, when the lamp was turned on the pump was started and the pre-heat feature apparently did help to stabilize the lamp at the low intensity ranges earlier than would have been true if the pre-heat feature had not been available. It is, in effect, an auxiliary heater. The pre-heat feature was apparently successful for one application but unsuccessful for the other.

4. The current 1540 Light Table has two pre-heat units of 125 watts each. The pump will run all of the time the pre-heat units are on. [ ] uses a combination of pre-heat units and fans, thermostatically controlled, to maintain the lamp as close as possible to a standard 105°; i.e., that temperature at which the lamp operates most efficiently. [ ] is not sure that two-pre-heat units are necessary. Experimentation may indicate that we can delete one of the units. Theory still indicates that an efficiently engineered pre-heater might increase overall efficiency and reduce the time required for the light to reach maximum brightness. It would appear that deleting the pre-heat feature would not prove advisable because it could greatly increase the instability of the lamp, particularly in the low intensity ranges where this would be manifested as unacceptable visual flicker. As a consequence, it does not seem realistic to follow this approach at this time. The problem as described in ESD's memo was greatly over simplified and did not address the total problem. There are still too many unanswered questions.

25X1  
25X1

5. I would make the following recommendations. That, when ESD has completely evaluated the [ ] 1540 Light Table, ESD perform some additional calculations and experiments to determine the following:

25X1

a. See if one of the two pre-heat units can be deleted by checking response with first both and then only a single unit working.

b. Disconnect the pre-heat feature entirely to determine the range and magnitude of any flickering problem that may result from the potential instability of the light source in the lower intensity ranges.

c. Determine the efficiency of the new pre-heat engineering design toward reaching high intensity output quicker by comparing against the old prototype.

SECRET

SECRET

Approved For Release 2004/03/26 : CIA-RDP78B05171A000200020201-3

25X1  
SUBJECT: [ ] Pre-Heat Feature

4. Determine the actual current drain of the lamp alone vice lamp and pre-heat features.

5. Determine the maximum current drain of the table if all of the items that can operate concurrently do operate concurrently--including starting loads.

6. Experimental data resulting from these investigations should go a long way towards dispelling the current confusion in this area.

25X1  
25X1  
[ ] does not have calculations or data covering any of these problems; since, theirs is--to all practical purposes--an empirical approach to engineering. [ ] did make one statement which could not be verified, but on the surface makes sense. [ ] feels that a pre-heat feature is a more efficient method of reaching operating temperature within a given time frame; since the heat has to come from somewhere. The alternative would be to pump vastly increased amounts of current into the lamp itself; in effect utilizing it as a "low efficiency" heater. 25X1

[ ]  
DC/ Research & Engineering Division,  
TSSG 25X1

Distribution:

Orig - Addressee

1 - File RED/SDB

✓ 1 - Chrono

25X1  
NPIC/TSSG/RED/SDB/[ ] (20 Feb 70)

Approved For Release 2004/03/26 : CIA-RDP78B05171A000200020201-3

SECRET